

General

Guideline Title

2012 update to the Society of Thoracic Surgeons guideline on use of antiplatelet drugs in patients having cardiac and noncardiac operations.

Bibliographic Source(s)

Ferraris VA, Saha SP, Oestreich JH, Song HK, Rosengart T, Reece TB, Mazer CD, Bridges CR, Despotis GJ, Jointer K, Clough ER. 2012 update to the Society of Thoracic Surgeons guideline on use of antiplatelet drugs in patients having cardiac and noncardiac operations. *Ann Thorac Surg*. 2012 Nov;94(5):1761-81. [237 references] [PubMed](#)

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Society of Thoracic Surgeons (STS). The Society of Thoracic Surgeons practice guideline series: aspirin and other anti-platelet agents during operative coronary revascularization. Chicago (IL): Society of Thoracic Surgeons (STS); 2003. 38 p. [190 references]

Recommendations

Major Recommendations

The levels of evidence (A-C) and classification of recommendations (I-III) are defined at the end of the "Major Recommendations" field.

Definition of Patients at High Risk for Perioperative Bleeding

Class I Recommendation

- a. Risk factor screening for bleeding in patients requiring cardiovascular procedures is indicated as soon as possible before operation to intervene and modify risk factors, if possible. Special attention should be given to patients with combinations of the major risk factors listed as follows: (1) advanced age, (2) diminished red blood cell volume (small body size or anemia), (3) complex operations (non-coronary artery bypass graft surgery, valve operations, thoracic aortic vascular procedures), (4) urgent operations, (5) preoperative medications (antiplatelet and anticoagulant drugs), and (6) chronic patient comorbidities (intrinsic platelet disorders, chronic illnesses like renal failure, chronic obstructive pulmonary disease, liver disease, and so forth). One of the few modifiable preoperative risk factors is use of antiplatelet drugs, and special attention should be given to this risk factor. (Level of evidence B)

Monitoring Platelet Function

Class IIb Recommendation

- a. Because of their high negative predictive value, preoperative point-of-care testing to assess bleeding risk may be useful in identifying patients

with high residual platelet reactivity after usual doses of antiplatelet drugs, and who can undergo operation without elevated bleeding risk. (Level of evidence B)

- b. Point-of-care testing to assess perioperative platelet function may be useful in limiting blood transfusion. (Level of evidence B)

Management of Patients Taking Antiplatelet Drugs in Specific Clinical Situations

Antiplatelet Drugs and the Patient at High Risk of Bleeding

Class I Recommendation

- a. Discontinuation of P2Y₁₂ inhibitors for a few days before cardiovascular operations is recommended to reduce bleeding and blood transfusion, especially in high-risk patients. Stopping antiplatelet drugs before operation is associated with reduced bleeding, blood transfusion, and reoperation but not with increased postoperative death, myocardial infarction (MI), or stroke. The interval between discontinuation of antiplatelet drugs and operation is uncertain and depends on multiple factors mostly related to patient drug responsiveness and risk of thrombotic complications. (Level of evidence B)

Class IIa Recommendation

- a. Preoperative discontinuation of aspirin in certain high-risk patients such as those who refuse blood transfusion for religious reasons (Jehovah's Witness) is reasonable. (Level of evidence B)
- b. Aspirin discontinuation before purely elective operations in patients without acute coronary syndrome (ACS) is reasonable to decrease the risk of bleeding. Aspirin increases perioperative bleeding and blood transfusion, but to a lesser extent than other antiplatelet drugs. This effect may depend on the dose of preoperative aspirin, with doses less than 100 mg daily having less bleeding risk but having important efficacy in patients with ACS. Multiple studies show no increased risk of myocardial events with discontinuation of aspirin for a few days before operation in these patients. (Level of evidence A)

Antiplatelet Drugs in Patients with Known Intrinsic (Hereditary) or Acquired Platelet Disorders

Class III Recommendation

- a. Patients with known preoperative intrinsic (hereditary) platelet defects and who require cardiac operations should not receive antiplatelet drugs before operation. (Level of evidence C)
- b. Patients with acquired preoperative platelet defects associated with thrombocytopenia or bleeding should not receive antiplatelet therapy before cardiac operations. (Level of evidence C)

Antiplatelet Drugs and Noncardiac Operations

Class IIa Recommendation

- a. Continuing antiplatelet monotherapy (with either aspirin or clopidogrel) is reasonable in patients undergoing most noncardiac operations, regardless of procedure urgency. Patients with very high risk from even modest bleeding (e.g., intracranial procedures) or expected major bleeding complications represent the only significant exceptions to this recommendation and should have antiplatelet therapy discontinued before operation if possible. (Level of evidence B)

Class IIb Recommendation

- a. Continuing dual antiplatelet therapy in patients with coronary stents who require noncardiac operations can be reasonable unless the risk of bleeding is prohibitive. (Level of evidence C)

Antiplatelet Drugs after Cardiac Operations

Class I Recommendation

- a. For stable nonbleeding patients, aspirin should be given within 6 to 24 hours of coronary artery bypass graft surgery (CABG) to optimize vein graft patency. (Level of evidence A)
- b. For patients undergoing CABG after ACS, guideline-indicated dual antiplatelet drugs should be restarted when bleeding risk is diminished to decrease intermediate-term major adverse cardiovascular outcomes. That may have the secondary benefit of increasing early vein graft patency. (Level of evidence A)

Class IIb Recommendation

- a. Once postoperative bleeding risk is decreased, testing of response to antiplatelet drugs, either with genetic testing or with point-of-care platelet function testing, early after cardiac procedures might be considered to optimize antiplatelet drug effect and minimize thrombotic risk to vein grafts. (Level of evidence B)
- b. For patients with high platelet reactivity after usual doses of clopidogrel, it may be helpful to switch to another P2Y12 inhibitor (e.g., prasugrel or ticagrelor). (Level of evidence C)

Treatment Options for Patients Taking Antiplatelet Drugs Who Require Urgent Operations

Class IIa Recommendation

- a. For patients who require urgent operation while on dual antiplatelet therapy, delay of even a day or two before operation is reasonable to decrease bleeding risk and minimize thrombotic risk in patients with ACS. (Level of evidence B)
- b. For patients on dual antiplatelet therapy, it is reasonable to make decisions about surgical delay based on tests of platelet inhibition rather than arbitrary use of a specified period of surgical delay. (Level of evidence B)

Class IIb Recommendation

- a. For patients requiring urgent operation while on dual antiplatelet therapy, bridging strategies using short-acting antiplatelet agents might be helpful in limiting bleeding while avoiding thrombotic risks. (Level of evidence B)
- b. For patients taking dual antiplatelet drugs for ACS or with drug-eluting stents less than 1 year old, operation should likely proceed at intervals less than 5 days to minimize prothrombotic risks of antiplatelet withdrawal, or with use of a short-acting antiplatelet agent "bridge" to minimize these risks. (Level of evidence C)
- c. Platelet transfusions may be helpful for patients on dual antiplatelet drug therapy who require urgent operation and have excessive perioperative bleeding. Platelet transfusion amounts may be excessive in this setting.
- d. For intractable operative bleeding in patients on dual antiplatelet drugs, recombinant factor VIIa may be helpful, but carries the risk of thrombosis. Risk-benefit analysis is essential in this situation. (Level of evidence C)

Multidisciplinary Approach to Use of Antiplatelet Drugs

Class IIa Recommendation

- a. Efforts at team coordination among multiple providers involved in the management of patients taking antiplatelet drugs who need cardiac procedures are reasonable and likely to result in reduced bleeding with safe operative outcomes. (Level of evidence B)

Definitions:

Levels of Evidence

Level A: Data derived from multiple randomized clinical trials or meta-analyses

Level B: Data derived from a single randomized trial or nonrandomized studies

Level C: Consensus opinion of experts, case studies, or standard of care

Classification of Recommendations

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment

- IIa: Weight of evidence/opinion is in favor of usefulness/efficacy
- IIb: Usefulness/efficacy is less well established by evidence/opinion

Class III: Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful/effective and in some cases may be harmful

- No Benefit- Procedure/Test not helpful or Treatment without established proven benefit
- Harm- Procedure/Test leads to excess cost without benefit or is harmful, and/or Treatment is harmful

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Conditions requiring cardiac and noncardiac operations

Guideline Category

Evaluation

Management

Risk Assessment

Treatment

Clinical Specialty

Anesthesiology

Cardiology

Critical Care

Emergency Medicine

Hematology

Internal Medicine

Pharmacology

Surgery

Thoracic Surgery

Intended Users

Advanced Practice Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To provide a synthesis of new information for the use of antiplatelet agents during the perioperative period in patients having cardiac and noncardiac operations
- To provide a broader discussion of point-of-care testing for monitoring platelet function and wider exploration of treatment options of patients exposed to antiplatelet drugs who need urgent operation
- To update the guideline previously published in 2005 by the Society of Thoracic Surgeons on aspirin and other antiplatelet agents during operative coronary revascularization

Target Population

Patients having urgent/emergent or elective cardiac and noncardiac operations who are exposed to antiplatelet drugs in the perioperative period

Interventions and Practices Considered

1. Risk factor screening for bleeding in patients requiring cardiovascular procedures with special attention to use of antiplatelet drugs
2. Monitoring platelet function with point-of-care testing
3. Perioperative management of patients taking antiplatelet drugs (discontinuation of P2Y12 inhibitors, antiplatelet agents, or aspirin)
4. Management of antiplatelet drugs in patients with intrinsic (hereditary) or acquired platelet defects (no antiplatelets before surgery)
5. Management of antiplatelet drugs during noncardiac operations (continuing antiplatelets in most cases)
6. Antiplatelet drugs after cardiac operations
 - Use of aspirin within 6 to 24 hours of coronary artery bypass graft surgery (CABG)
 - Dual antiplatelet therapy after CABG in patients with acute coronary syndrome
 - Testing of response to antiplatelet drugs with genetic testing or with point-of-care platelet function testing
 - Switching to another P2Y12 inhibitor in patients with high platelet reactivity after clopidogrel
7. Treatment options for patients on antiplatelet drugs who require urgent operations
 - Delaying operations
 - Making decisions about delay based on tests of platelet inhibition
 - Bridging strategies using short-acting antiplatelet agents
 - Platelet transfusions for patients with excessive bleeding
 - Recombinant factor VIIa for intractable bleeding
8. Multidisciplinary management of patients taking antiplatelet drugs

Major Outcomes Considered

- Mortality
- Morbidity
- Risk factors for bleeding
- Thrombotic risks/complications
- Blood transfusion rates
- Operative bleeding
- Major adverse cardiovascular outcomes

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The search methods used to survey the published literature changed in the current guideline version compared with the previously published guideline. In the interest of transparency, literature searches were conducted using standardized Medical Subject Heading (MeSH) terms from the National Library of Medicine PubMed database list of search terms. The following terms comprised the standard baseline search terms for all topics and were connected with the logical "OR" connector: extracorporeal circulation (MeSH number E04.292 includes extracorporeal membrane oxygenation, left heart bypass, hemofiltration, hemoperfusion and cardiopulmonary bypass); cardiovascular surgical procedures (MeSH number E04.100 includes off-pump coronary artery bypass graft surgery [CABG], CABG, myocardial revascularization, all valve operations, and all other operations on the heart); vascular diseases (MeSH number C14.907 includes dissections, aneurysms of all types including left ventricular aneurysms, and all vascular diseases); and pharmacologic actions (MeSH number D27.505 includes molecular mechanisms, physiologic effects, and therapeutic use of drugs).

Use of these broad search terms allowed specific topics to be added to the search with the logical "AND" connector. This search methodology provided a broad list of generated references specific for the search topic. Individual members of the writing group read the retrieved references for their assigned topics and formulated recommendations based on assessment of the relevant literature. Only English language articles contributed to the final recommendations. For almost all topics reviewed, only evidence relating to adult patients were entered into the final recommendations, primarily because of limited availability of high-quality evidence relating to pediatric patients having cardiac procedures.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Level of Evidence

Level A: Data derived from multiple randomized clinical trials or meta-analyses

Level B: Data derived from a single randomized trial or non-randomized studies

Level C: Consensus opinion of experts, case studies, or standard of care

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Members of the writing group assigned to a specific topic made recommendations about use of antiplatelet agents in the perioperative period based on review of important articles obtained using the search technique described above. The quality of information for a given recommendation allowed assessment of the level of evidence as recommended by the American Heart Association/American College of Cardiology Foundation Task Force on Practice Guidelines (available from the: [American Heart Association Web site](#) ; see the "Rating Scheme for the Strength of the Evidence" field). Writers assigned to the various antiplatelet drug topics wrote and developed new or amended recommendations, but each final recommendation that appears in this revision was approved by at least a two-thirds majority favorable vote from all members of the writing group. Table 1 and Appendix 1 (see Appendix in Auxiliary Annals section of the [Society of Thoracic Surgeons \[STS\] Web site](#)) contain summaries of recommendations and the results of the voting for each recommendation, and explain any major individual dissensions.

Rating Scheme for the Strength of the Recommendations

Classification of Recommendations

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment

- IIa: Weight of evidence/opinion is in favor of usefulness/efficacy
- IIb: Usefulness/efficacy is less well established by evidence/opinion

Class III: Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful/effective and in some cases may be harmful

- No Benefit- Procedure/Test not helpful or Treatment without established proven benefit
- Harm- Procedure/Test leads to excess cost without benefit or is harmful, and/or Treatment is harmful

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the 'Major Recommendations' field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate use of antiplatelet drugs in patients undergoing cardiac and noncardiac operations

Potential Harms

The bleeding risk associated with antiplatelet drugs must always be weighed against the thrombotic risk of major adverse cardiovascular events (death, stroke, myocardial infarction) if antiplatelet drugs are discontinued (see the [original guideline document](#) for details of the adverse effects of specific drugs).

Contraindications

Contraindications

Prasugrel is contraindicated in patients with a history of transient ischemic attack or stroke and is not generally recommended for patients aged 75 years or older or those weighing less than 60 kg.

Qualifying Statements

Qualifying Statements

The Society of Thoracic Surgeons Clinical Practice Guidelines are intended to assist physicians and other health care providers in clinical decision making by describing a range of generally acceptable approaches for the diagnosis, management, or prevention of specific diseases or conditions. These guidelines should not be considered inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the same results. Moreover, these guidelines are subject to change over time, without notice. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of the individual circumstances presented by the patient.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Safety

Timeliness

Identifying Information and Availability

Bibliographic Source(s)

Ferraris VA, Saha SP, Oestreich JH, Song HK, Rosengart T, Reece TB, Mazer CD, Bridges CR, Despotis GJ, Jointer K, Clough ER. 2012 update to the Society of Thoracic Surgeons guideline on use of antiplatelet drugs in patients having cardiac and noncardiac operations. *Ann Thorac Surg*. 2012 Nov;94(5):1761-81. [237 references] [PubMed](#)

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2003 (revised 2012 Nov)

Guideline Developer(s)

Society of Thoracic Surgeons - Medical Specialty Society

Source(s) of Funding

Society of Thoracic Surgeons

Guideline Committee

Society of Thoracic Surgeons Workforce on Evidence Based Surgery

Composition of Group That Authored the Guideline

Society of Thoracic Surgeons Workforce on Evidence Based Surgery Members: Victor A. Ferraris, MD, PhD; Siby P. Saha, MD, MBA; Julie H. Oestreich, PharmD, PhD; Howard K. Song, MD; Todd Rosengart, MD; T. Brett Reece, MD; C. David Mazer, MD; Charles R. Bridges, MD, ScD; George J. Despotis, MD, PhD; Kanae Jointer, BA; Ellen R. Clough, PhD

Financial Disclosures/Conflicts of Interest

Author	Disclosure	Lecture Fees, Consultant, Paid Work From Industry Within 12 Months	Research Grant Support From Industry Within 12 Months
V. A. Ferraris	Yes	Baxter Healthcare (CME event), AstraZeneca (Advisory Board)	None
S. P. Saha	Yes		Baxter Healthcare, CVRx
J. Oestreich	Yes	Xcenda (consultant)	
H. K. Song	Yes		Novo Nordisk A/S
T. Rosengart	No		
T. B. Reece	Yes	Baxter HealthCare (CME event), Sorin Medical (CME event)	
C. D. Mazer	Yes	AstraZeneca, Cubist, Medicines Company, Quark	NovoNordisk, Cubist, Hospira
C. R. Bridges	Yes	Baxter HealthCare (CME event)	
G. J. Despotis	Yes	Genzyme, CSL Behring, Zymogenetics, Bayer, Cubist, SCS Healthcare, Telacris, Eli Lilly	
K. Jointer	No		

Author Clough	Disclosure	Lecture Fees, Consultant, Paid Work From Industry Within 12 Months	Research Grant Support From Industry Within 12 Months

CME = continuing medical education

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Society of Thoracic Surgeons (STS). The Society of Thoracic Surgeons practice guideline series: aspirin and other anti-platelet agents during operative coronary revascularization. Chicago (IL): Society of Thoracic Surgeons (STS); 2003. 38 p. [190 references]

Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the [Society of Thoracic Surgeons Web site](#) .

Print copies: Available from The Society of Thoracic Surgeons, 633 N. Saint Clair St., Suite 2320, Chicago, IL, USA 60611-3658.

Availability of Companion Documents

Appendices to the original guideline document are available from the [Society of Thoracic Surgeons Web site](#) .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on March 25, 2005. The information was verified by the guideline developer on May 2, 2005. This summary was updated by ECRI on February 14, 2006 following the U.S. Food and Drug Administration (FDA) advisory on Trasylol (aprotinin). This summary was updated by ECRI on October 4, 2006 following the updated FDA advisory on Trasylol (aprotinin). This summary was updated by ECRI on January 5, 2007 following the updated FDA advisory on Trasylol (aprotinin). This summary was updated by ECRI on March 6, 2007 following the FDA advisory on Coumadin (warfarin sodium). This summary was updated by ECRI Institute on June 22, 2007 following the U.S. Food and Drug Administration (FDA) advisory on heparin sodium injection. This summary was updated by ECRI Institute on September 7, 2007 following the revised U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin). This summary was updated by ECRI Institute on December 13, 2012.

Copyright Statement

© 2012 The Society of Thoracic Surgeons

The Society of Thoracic Surgeons Practice Guidelines may be printed or downloaded for individual and personal use only. Guidelines may not be reproduced in any print or electronic publication or offered for sale or distribution in any format without the express written permission of the Society of Thoracic Surgeons.

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouse^{â„¢} (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the [NGC Inclusion Criteria](#).

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.